CS 171 Computer Programming 1

Winter 2016

Lab 3 – Conditionals

NAME: LAB:

Question 1: Getting Started

Download the program cond_ex.cpp onto your computer and compile it. You will see a number of compile-time errors. Record the errors you get in the below. If your compiler generates more than 5 errors, just cut and paste 5 of them below.

Answer:

Syntax Error: identifier 'grade'
Syntax Error: missing ';' before '{'
Syntax Error: identifier 'grade'
expected a '{'

Question 2: Fixing the Syntax Errors:

Your next step is to get the program to compile. Discuss the errors with your group and figure out what needs to be done to correct them, and each member of the group should apply those changes. Once you have all got the program to compile, record in the below the changes you had to make to get it to compiler properly.

Note: If you identify logic errors while you are working on the syntax errors, hold off fixing them for now. We will be working with them in later questions.

Answer: the program was missing some curly brackets '{', I simply added them in and then the program compiled.

Question 3: Testing the Program

Now that you have the program compiling, it's time to test it and see if it works correctly. In your group, discuss what set of test cases will fully test the program's functionality. Run the program on the inputs your group identifies and determine whether it produces the right outputs. You should be able to find one logic error that affects all test cases and at least one test case where it produces the wrong output. Record below the set of test cases (both inputs and outputs) that you used to test the program and find that there was a logic error.

Answer:I enetered values between 50-100 by increments of 5 to check the outputs. Through this test it should that there was something wrong with the 'grade' value since it was returning the output for '100' each time. After changing the first if statement so that 'grade' wasn't being modified, I began testing again. I then found that around 60 it was showing that one of the if statements had the wrong symbols to correctly compare the grade value to 60. I also got rid of a lot of if statements because as long as the program looks at the grade variable comparing it from greatest value to lowest value all in one long else if statement, you don't need other if statements to check if it is still bellow the last checked value.

Question 4: Identifying the Problem

Within your group, discuss why the failing test case fails and what in the code is misbehaving. Describe your conclusions below

Answer:

the failed tests failed because of the incorrect use or the loss of comparison symbols. Things like forgetting to use an ='s sign or putting a less than rather than a greater than sign. There was also the case of the 'grade = 100' at the beginning where the grade was set to 100 rather than being compared to it, which was an easy fix of adding another equals sign.

Question 5: Fixing the Error

Now that you know what's wrong, what do you need to change in the program to fix the error? Apply your change and re-run your test cases. Continue debugging until your program works correctly. Describe below what changes you had to make to get it running properly. Cut and paste in the code fragment you had to change.

Answer: I changed nearly all of the code because there was a lot of unnecessary if statements.

```
        int grade;
        cout << "What grade did you make? ";
        cin >> grade;
        if (grade == 100){
                cout << "Congratulations, you got a perfect score: A+\n";
        }
        else if(grade >= 90)
        {
                        cout << "Very good: A\n";
        }
        else if (grade >= 80)
        {
                cout << "Good job: B\n";
        }
        else if (grade >= 70)
        {
                        cout << "Not bad: C\n";
        }
        else if(grade >= 60)
        {
                        cout << "Not so good: D\n";
        }
        else if(grade < 60
                cout << "We need to talk: F\n";
```

```
        std::cin.ignore(1);
        cout << "enter anything to end the program" << endl;
        cin.get();
        return 0;
```

Question 6: Validating the Input

You'll notice that the program happily takes any input you give it and acts on it. Yet, some possible input values aren't quite sane. If we do not give extra credit, and if we have anything like a normal grading scheme, then the numeric grades should fall between 0 and 100, inclusive. Modify the program so that negative grades and grades greater than 100 are rejected and no letter grade is given. Run your test cases again to make sure the program continues to function correctly. Also add test cases to ensure that you are properly catching invalid input. Put in your answer sheet the code you added to accomplish this.

Answer:

```
if (!(grade > 0 || grade < 0))
                {
             cout << "That is not a valid input" << endl;
                }

else if (grade > 100){
                    cout << "sorry but you can not have over 100." << endl;
                }
else if (grade < 0)
                {
                    cout << "Bellow zero is an invalid input" << endl;
                }
```

Question 7: Streamlining Your Code

This program uses a lot of nested **if** statements. Making use of the Boolean operators (&& and ||), modify the program to simplify the code. Your result should be a program that is equivalent in functionality but has fewer lines of code and is easier to read. Again, verify that you haven't broken anything by running all your test cases.

Place your new version of the code in your answer sheet.

Answer:

I already took out a lot of the if statements by combining all of the if statements into one if, if else statement sequence, making sure they happen in an order that assures the right results are outputted.

```
#include <iostream>
using namespace std;
int main()
{
	int grade;
	cout << "What grade did you make? ";
	cin >> grade;
		if (!(grade > 0 || grade < 0))
		{
			cout << "That is not a valid input" << endl;
		}
		else if (grade > 100){
			cout << "sorry but you can not have over 100." << endl;
		}
		else if (grade == 100){
			cout << "Congratulations, you got a perfect score: A+\n" << endl;
		}
		else if (grade >= 90)
		{
			cout << "Very good: A\n" << endl;
		}
		else if (grade >= 80)
```

```
            {
                cout << "Good job: B\n" << endl;
            }
        else if (grade >= 70)
            {
                cout << "Not bad: C\n" << endl;
            }
        else if (grade >= 60)
            {
                cout << "Not so good: D\n" << endl;
            }
        else if (grade < 60)
            {
                cout << "We need to talk: F\n" << endl;
            }
        else if (grade < 0)
            {
                cout << "Bellow zero is an invalid input" << endl;
            }
    std::cin.ignore(2);
    cout << "enter anything to end the program" << endl;
    cin.get();
    return 0;
}
```

Question 8: Further Improvement

Can you make the code even cleaner and more straightforward by the judicious use of **else** clauses? You should be able to substantially reduce the number of compound conditional expressions by recognizing that there is a lot of redundancy in the tests that are being made and that you can take advantage of that redundancy by using **else** to simplify the expressions.

Apply those observations to further simplify the code and paste your new code in your answer sheet.

Answer: okay, so for the third time, I fixed this issue previously and I am going to post the same code that I used above.

```
#include <iostream>
using namespace std;
int main()
{
	int grade;
	cout << "What grade did you make? ";
	cin >> grade;
		if (!(grade > 0 || grade < 0))
		{
			cout << "That is not a valid input" << endl;
		}
		else if (grade > 100){
			cout << "sorry but you can not have over 100." << endl;
		}
		else if (grade == 100){
			cout << "Congratulations, you got a perfect score: A+\n" << endl;
		}
		else if (grade >= 90)
		{
			cout << "Very good: A\n" << endl;
		}
		else if (grade >= 80)
		{
			cout << "Good job: B\n" << endl;
		}
		else if (grade >= 70)
		{
			cout << "Not bad: C\n" << endl;
		}
```

```
            else if (grade >= 60)
            {
                  cout << "Not so good: D\n" << endl;
            }
            else if (grade < 60)
            {
                  cout << "We need to talk: F\n" << endl;
            }
            else if (grade < 0)
            {
                  cout << "Bellow zero is an invalid input" << endl;
            }
      std::cin.ignore(2);
      cout << "enter anything to end the program" << endl;
      cin.get();
      return 0;
}
```

Question 9: Extra Credit – Plusses and Minuses

For extra credit, modify the grade program so that it can report pluses and minuses as well as the basic letter grade. Put your revised program in your answer sheet.

Answer:

```cpp
#include <iostream>

using namespace std;

int main()
{
	int grade;

	cout << "What grade did you make? ";
	cin >> grade;



		if (!(grade > 0 || grade < 0))
		{
			cout << "That is not a valid input" << endl;
		}
		else if (grade > 100){
			cout << "sorry but you can not have over 100." << endl;
		}
		else if (grade == 100){
			cout << "Congratulations, you got a perfect score: A+\n" << endl;
		}
		else if (grade >= 96)
		{
			cout << "Very good: A+\n" << endl;
		}
		else if (grade >= 93)
		{
			cout << "Very good: A\n" << endl;
		}
		else if (grade >= 90)
		{
```

```
                    cout << "Very good: A-\n" << endl;
            }
            else if (grade >= 86)
            {
                    cout << "Good job: B+\n" << endl;
            }
            else if (grade >= 83)
            {
                    cout << "Good job: B\n" << endl;
            }
            else if (grade >= 80)
            {
                    cout << "Good job: B-\n" << endl;
            }
            else if (grade >= 76)
            {
                    cout << "Not bad: C+\n" << endl;
            }
            else if (grade >= 73)
            {
                    cout << "Not bad: C\n" << endl;
            }
            else if (grade >= 70)
            {
                    cout << "Not bad: C-\n" << endl;
            }
            else if (grade >= 66)
            {
                    cout << "Not so good: D+\n" << endl;
            }
            else if (grade >= 63)
            {
```

```
                    cout << "Not so good: D\n" << endl;
                }
                else if (grade >= 60)
                {
                    cout << "Not so good: D-\n" << endl;
                }
                else if (grade < 60)
                {
                    cout << "We need to talk: F\n" << endl;
                }
                else if (grade < 0)
                {
                    cout << "Bellow zero is an invalid input" << endl;
                }


        std::cin.ignore(2);

        cout << "enter anything to end the program" << endl;

        cin.get();

        return 0;
}
```